WHAT IS CLAIMED IS:

1. A method of estimating power consumption and noise levels of an integrated circuit which is composed of logic gates connected in the form of a plurality of stages, comprising the steps of:

calculating output signal waveforms and occurrence probabilities thereof at the first stage of the logic gates by the use of signal waveforms and occurrence probabilities thereof at input terminals of the integrated circuit (hereafter called the primary input terminals);

calculating output signal waveforms and occurrence probabilities thereof at the second stage of the logic gates by the use of said output signal waveform and said occurrence probability thereof at said primary input terminals and said output signal waveform and said occurrence probability thereof at the first stage of the logic gates; and in the same manner

calculating output signal waveforms and occurrence probabilities thereof at the n-th stage (n is a natural number) of the logic gates by the use of said output signal waveform and said occurrence probability thereof at said primary input terminals and said output signal waveform and said occurrence probability thereof at the (n-1)th stage of the logic gates,

wherein types of the respective elementary waveforms, occurrence probabilities and signal correlations are calculated relating to signals located on each wiring of each stage inside of the integrated circuit and occurring within a predetermined time period.

2. The method of estimating power consumption and noise levels of an integrated circuit as claimed in claim 1 wherein the probability $P(W_A \wedge W_B)$ of the combination of a elementary waveform W_A at one input terminal and a elementary waveform W_B at another input terminal are calculated by the use of

$$P(W_A \wedge W_B) = P(W_A)\,P(W_B) + \sum_{i=1}^{n} \sum_{\alpha<\beta} P(w_i^{\alpha})\,P(w_i^{\beta})\,\left(P(W_A \mid w_i^{\alpha}) - P(W_A \mid w_i^{\beta})\right)\left(P(W_B \mid w_i^{\alpha}) - P(W_B \mid w_i^{\beta})\right)$$

where w_i^α designates the α-th elementary waveform of the i-th primary input; n designates the number of the primary inputs; and m_i designates the number of the elementary waveforms of the i-th primary input; $P(W_A | w_i^\alpha)$ is the conditional probability of the elementary waveform W_A under the condition that the α-th elementary waveform occurs at the i-th primary input terminal.

3. The method of estimating power consumption and noise levels of an integrated circuit as claimed in claim 2 further comprising:

a step of assigning $P(W_A) * P(W_B)$ to $P(W_A \wedge W_B)$;

a step of setting the initial values of i and α respectively to 1 and β to $\alpha + 1$;

a step of incrementing $P(W_A \wedge W_B)$ by

$$P(w_i^\alpha)P(w_i^\beta)(P(W_A | w_i^\alpha) - P(W_A | w_i^\beta))(P(W_B | w_i^\alpha) - P(W_B | w_i^\beta))$$

a first loop in which $P(W_A \wedge W_B)$ is incremented by

$$P(w_i^\alpha)P(w_i^\beta)(P(W_A | w_i^\alpha) - P(W_A | w_i^\beta))(P(W_B | w_i^\alpha) - P(W_B | w_i^\beta))$$

anew each time β is incremented by 1 in steps from $\alpha + 1$ to the number of types of the elementary waveforms of said another input terminal;

a second loop in which, each time β reaches the number of types of the elementary waveforms of said another input terminal, α is incremented by 1 followed by returning to said first loop, said second loop being repeated until α reaches to the number of types of the elementary waveforms of said one input terminal; and

a third loop in which, each time α reaches to the number of types of the elementary waveforms of said one input terminal, i is incremented by 1 followed by returning to said second loop, said third loop being repeated until i reaches to the number of the primary input terminals.

4. The method of estimating power consumption and noise levels of an integrated circuit as claimed in claim 1 wherein said predetermined time period is divided into a plurality of time blocks; and wherein, if elementary

waveforms have the same pattern of signal transitions as considered only at the boundary between each adjacent time blocks, such elementary waveforms are recognized as the same elementary waveform even in the case that there is a difference therebetween inside of a time block.

5. The method of estimating power consumption and noise levels of an integrated circuit as claimed in claim 1 wherein, in the step of calculating the types of the respective elementary waveforms, the occurrence probabilities and the signal correlations relating to signals located on each wiring of each stage inside of the integrated circuit and occurring within a predetermined time period, the occurrence probabilities of the signal waveforms are calculated without taking into consideration those of said signal waveforms whose said occurrence probabilities are no higher than a predetermined value.

6. The method of estimating power consumption and noise levels of an integrated circuit as claimed in claim 4 wherein, in the step of calculating the types of the respective elementary waveforms, the occurrence probabilities and the signal correlations relating to signals located on each wiring of each stage inside of the integrated circuit and occurring within a predetermined time period, the occurrence probabilities of the signal waveforms are calculated without taking into consideration those of said signal waveforms whose said occurrence probabilities are no higher than a predetermined value.

7. A computer-readable recording medium storing a program for estimating power consumption and noise levels of an integrated circuit which is composed of logic gates connected in the form of a plurality of stages, comprising the steps of:

calculating output signal waveforms and occurrence probabilities thereof at the first stage of the logic gates by the use of signal waveforms and occurrence probabilities thereof at input terminals of the integrated circuit (hereafter called the primary input terminals);

calculating output signal waveforms and occurrence probabilities thereof at the second stage of the logic gates by the use of said output signal waveform and said occurrence probability thereof at said primary input terminals and said output signal waveform and said occurrence probability

thereof at the first stage of the logic gates; and in the same manner

calculating output signal waveforms and occurrence probabilities thereof at the n-th stage (n is a natural number) of the logic gates by the use of said output signal waveform and said occurrence probability thereof at said primary input terminals and said output signal waveform and said occurrence probability thereof at the (n-1)th stage of the logic gates,

wherein types of the respective elementary waveforms, occurrence probabilities and signal correlations are calculated relating to signals located on each wiring of each stage inside of the integrated circuit and occurring within a predetermined time period.

8. The computer-readable recording medium storing the program for estimating power consumption and noise levels of an integrated circuit as claimed in claim 7 wherein

the probability $P(W_A \wedge W_B)$ of the combination of a elementary waveform W_A at one input terminal and a elementary waveform W_B at another input terminal are calculated by the use of

$$P(W_A \wedge W_B) = P(W_A)\,P(W_B) + \sum_{i=1}^{n} \sum_{\alpha<\beta} P(w_i^{\alpha})\,P(w_i^{\beta})\,\left(P(W_A \mid w_i^{\alpha}) - P(W_A \mid w_i^{\beta})\right)\left(P(W_B \mid w_i^{\alpha}) - P(W_B \mid w_i^{\beta})\right)$$

where w_i^{α} designates the α-th elementary waveform of the i-th primary input; n designates the number of the primary inputs; and m_i designates the number of the elementary waveforms of the i-th primary input;

$P(W_A \mid w_i^{\alpha})$ is the conditional probability of the elementary waveform W_A under the condition that the α-th elementary waveform occurs at the i-th primary input terminal.

9. The computer-readable recording medium storing the program for estimating power consumption and noise levels of an integrated circuit as claimed in claim 8 further comprising:

a step of assigning $P(W_A) * P(W_B)$ to $P(W_A \wedge W_B)$;

a step of setting the initial values of i and α respectively to 1 and β to $\alpha + 1$;

a step of incrementing $P(W_A \wedge W_B)$ by

$$P(w^{\alpha}_{i})P(w^{\beta}_{i})(P(W_A \mid w^{\alpha}_{i}) - P(W_A \mid w^{\beta}_{i}))(P(W_B \mid w^{\alpha}_{i}) - P(W_B \mid w^{\beta}_{i}))$$

a first loop in which $P(W_A \wedge W_B)$ is incremented by

$$P(w^{\alpha}_{i})P(w^{\beta}_{i})(P(W_A \mid w^{\alpha}_{i}) - P(W_A \mid w^{\beta}_{i}))(P(W_B \mid w^{\alpha}_{i}) - P(W_B \mid w^{\beta}_{i}))$$

anew each time β is incremented by 1 in steps from $\alpha + 1$ to the number of types of the elementary waveforms of said another input terminal;

a second loop in which, each time β reaches the number of types of the elementary waveforms of said another input terminal, α is incremented by 1 followed by returning to said first loop, said second loop being repeated until α reaches to the number of types of the elementary waveforms of said one input terminal; and

a third loop in which, each time α reaches to the number of types of the elementary waveforms of said one input terminal, i is incremented by 1 followed by returning to said second loop, said third loop being repeated until i reaches to the number of the primary input terminals.

10. The computer-readable recording medium storing the program for estimating power consumption and noise levels of an integrated circuit as claimed in claim 7 wherein said predetermined time period is divided into a plurality of time blocks; and wherein, if elementary waveforms have the same pattern of signal transitions as considered only at the boundary between each adjacent time blocks, such elementary waveforms are recognized as the same elementary waveform even in the case that there is a difference therebetween inside of a time block.

11. The computer-readable recording medium storing the program for estimating power consumption and noise levels of an integrated circuit as claimed in claim 7 wherein, in the step of calculating the types of the respective elementary waveforms, the occurrence probabilities and the signal correlations relating to signals located on each wiring of each stage inside of

the integrated circuit and occurring within a predetermined time period, the occurrence probabilities of the signal waveforms are calculated without taking into consideration those of said signal waveforms whose said occurrence probabilities are no higher than a predetermined value.

12. The computer-readable recording medium storing the program for estimating power consumption and noise levels of an integrated circuit as claimed in claim 10 wherein, in the step of calculating the types of the respective elementary waveforms, the occurrence probabilities and the signal correlations relating to signals located on each wiring of each stage inside of the integrated circuit and occurring within a predetermined time period, the occurrence probabilities of the signal waveforms are calculated without taking into consideration those of said signal waveforms whose said occurrence probabilities are no higher than a predetermined value.